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INTRODUCTION

- LIVESTOCK occupy 30% of global surface area
- By 2030, consumption is projected to increase by 57% for MILK and by 68% for MEAT (FAO, 2006)

→ SUSTAINABLE INTENSIFICATION necessary to avoid large scale land use change and related GHG emissions and Biodiversity loss

LIVESTOCK PRODUCTION SYSTEMS (LPS)

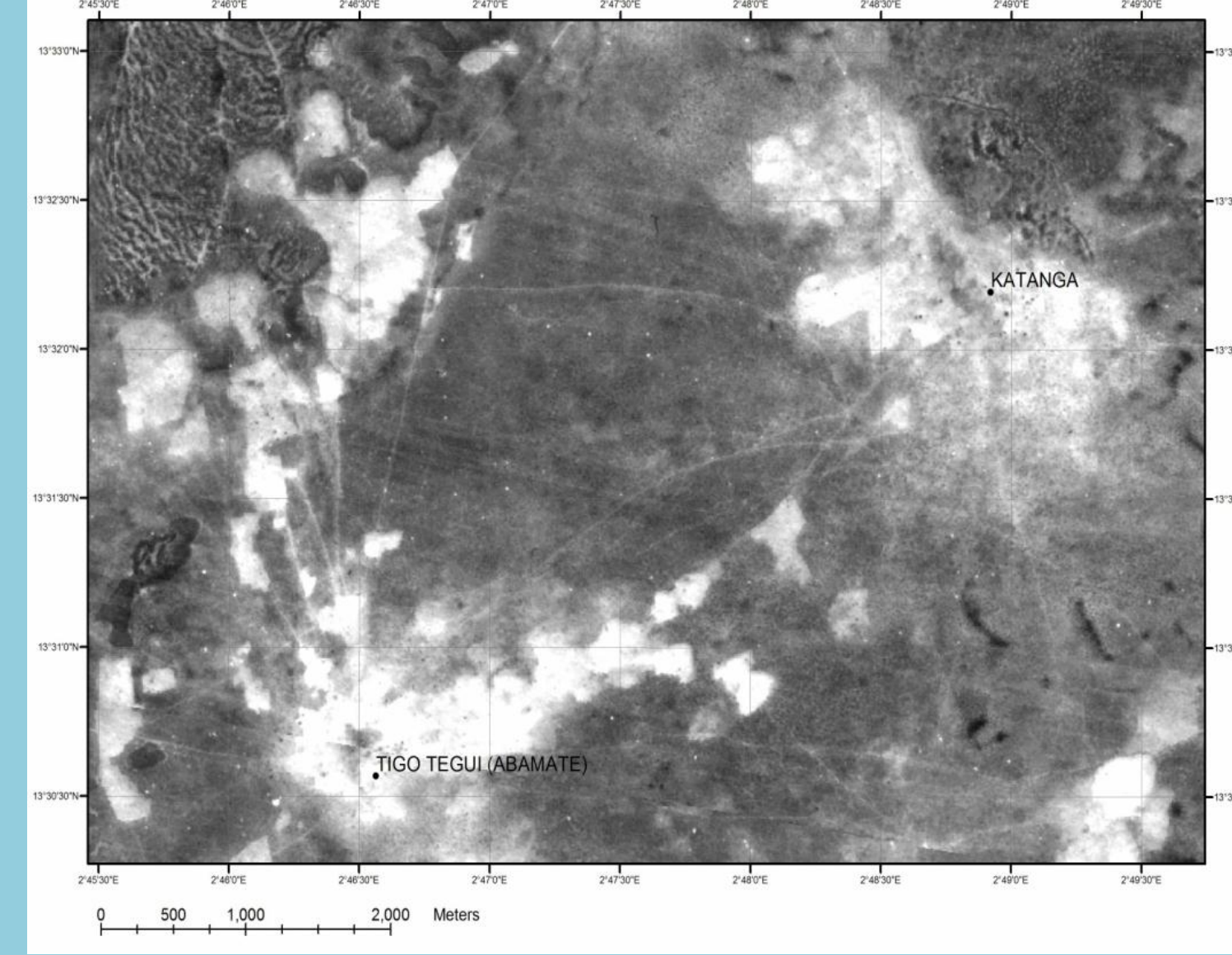
Sere and Steinfeld (1996) differentiate three main LPS

- Grassland based (LG)
- Mixed crop-livestock (MX)
- Landless (LL)

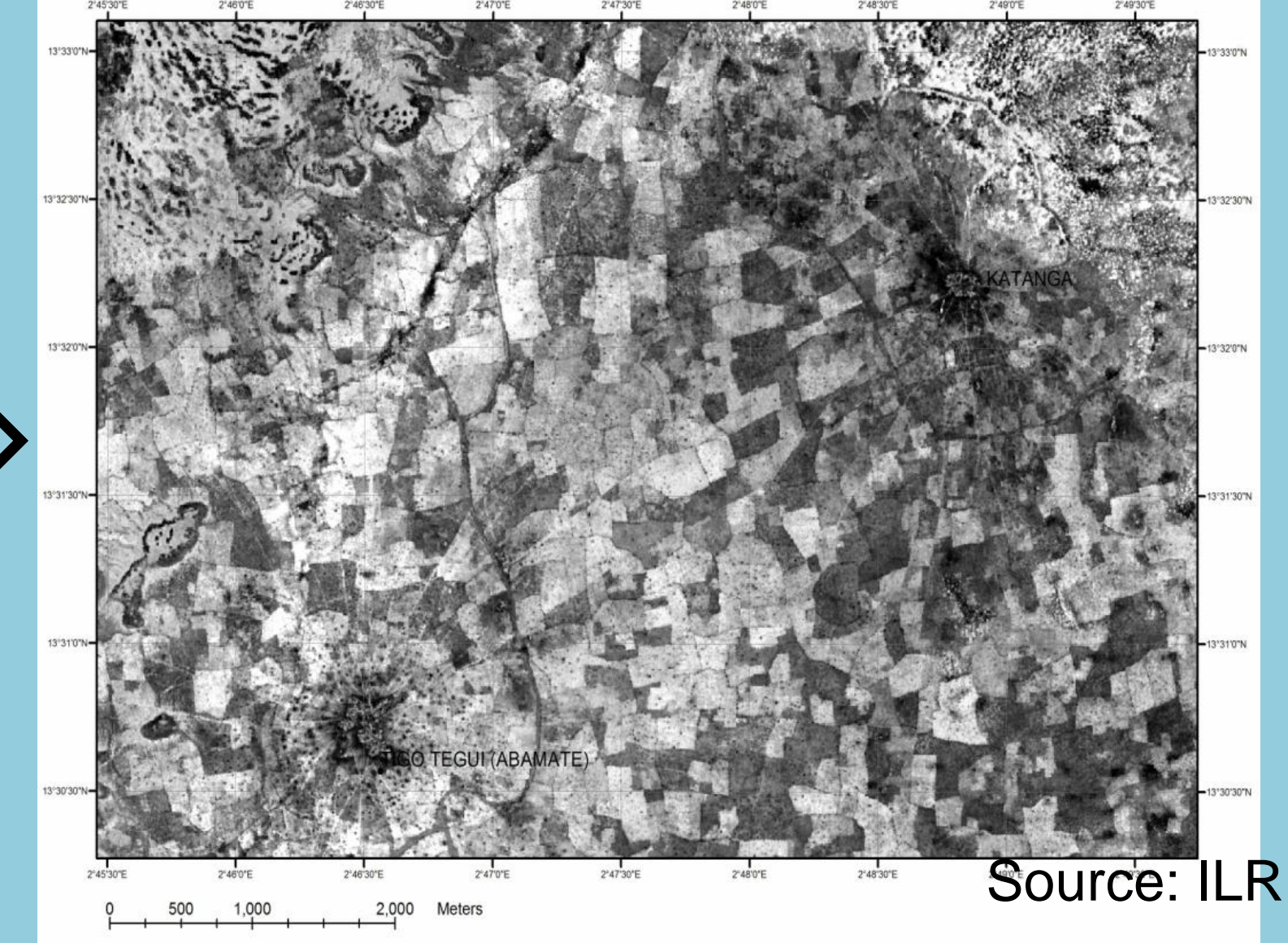
What future LPS transitions and their role in sustainable intensification?

LIVESTOCK PRODUCTION SYSTEMS TRANSITION (Western Africa)

1966 – PASTORAL SYSTEM



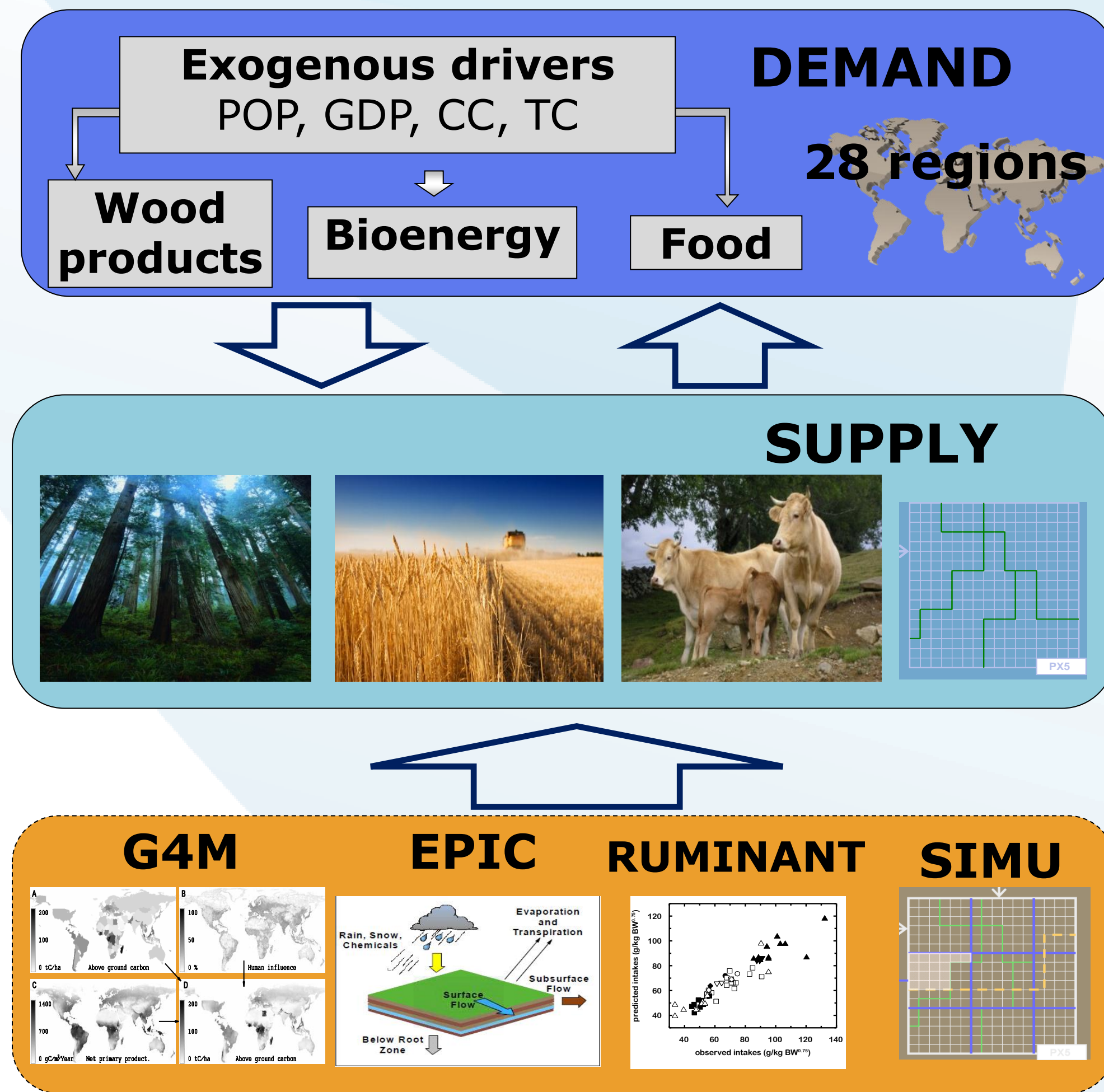
2004 - MIXED SYSTEM



Source: ILRI

GLOBIOM

(Global Biosphere Management Model)



METHODOLOGY

1. General Framework: GLOBIOM

- Partial Equilibrium: Agriculture, Forestry, Bioenergy
- Production functions with high spatial resolution and calibrated by biophysical models (e.g. RUMINANT)

2. Livestock modeling

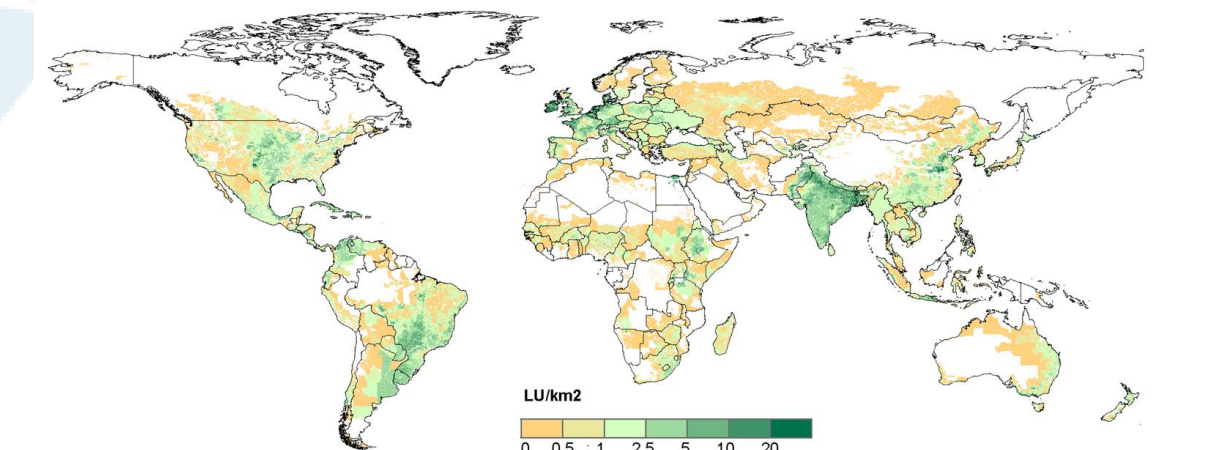
- LPS classification including agroecology: Arid (A), Humid (H), Temperate/highlands (T)
- New datasets developed for systems parameterization + input coefficients (feed baskets) + output coefficients (meat & milk productivity, CH₄ emissions, manure production...) and harmonized with FAO country level data

3. Scenario Analysis

REF0 – Livestock production systems structure fixed at 2000 values

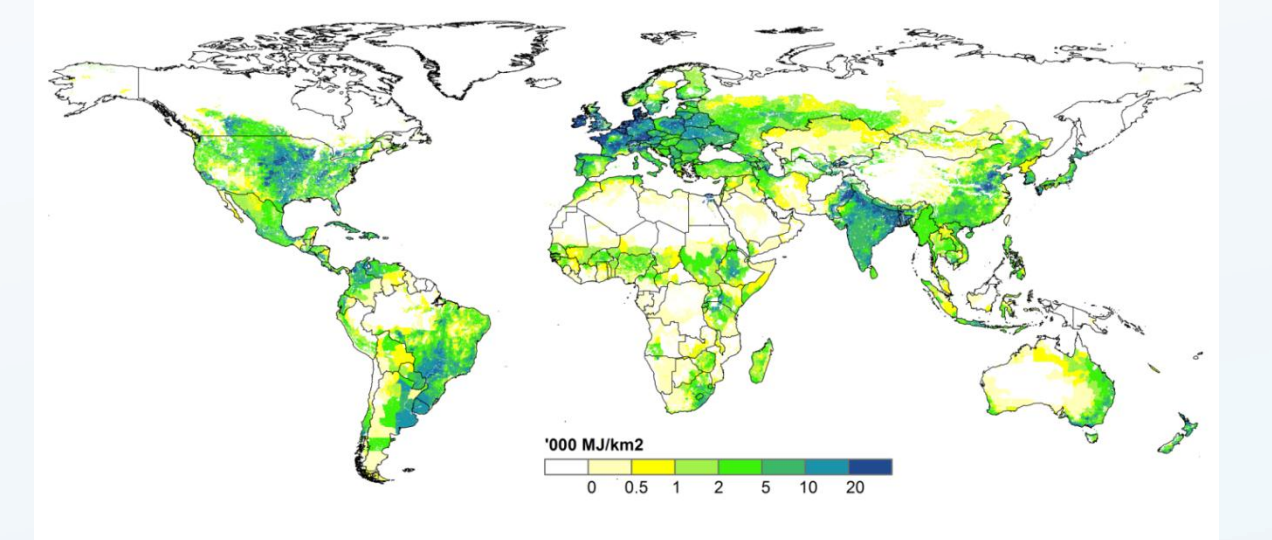
REF1 – Transition between LG and MX allowed

Bovine density

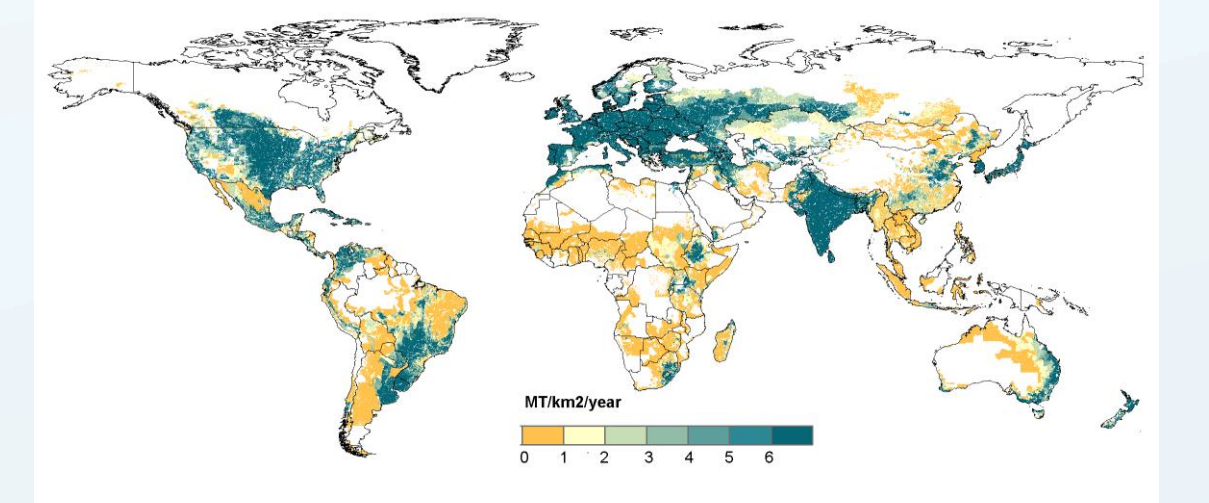


Source: GLW – FAO (2007)

Energy intake by ruminants

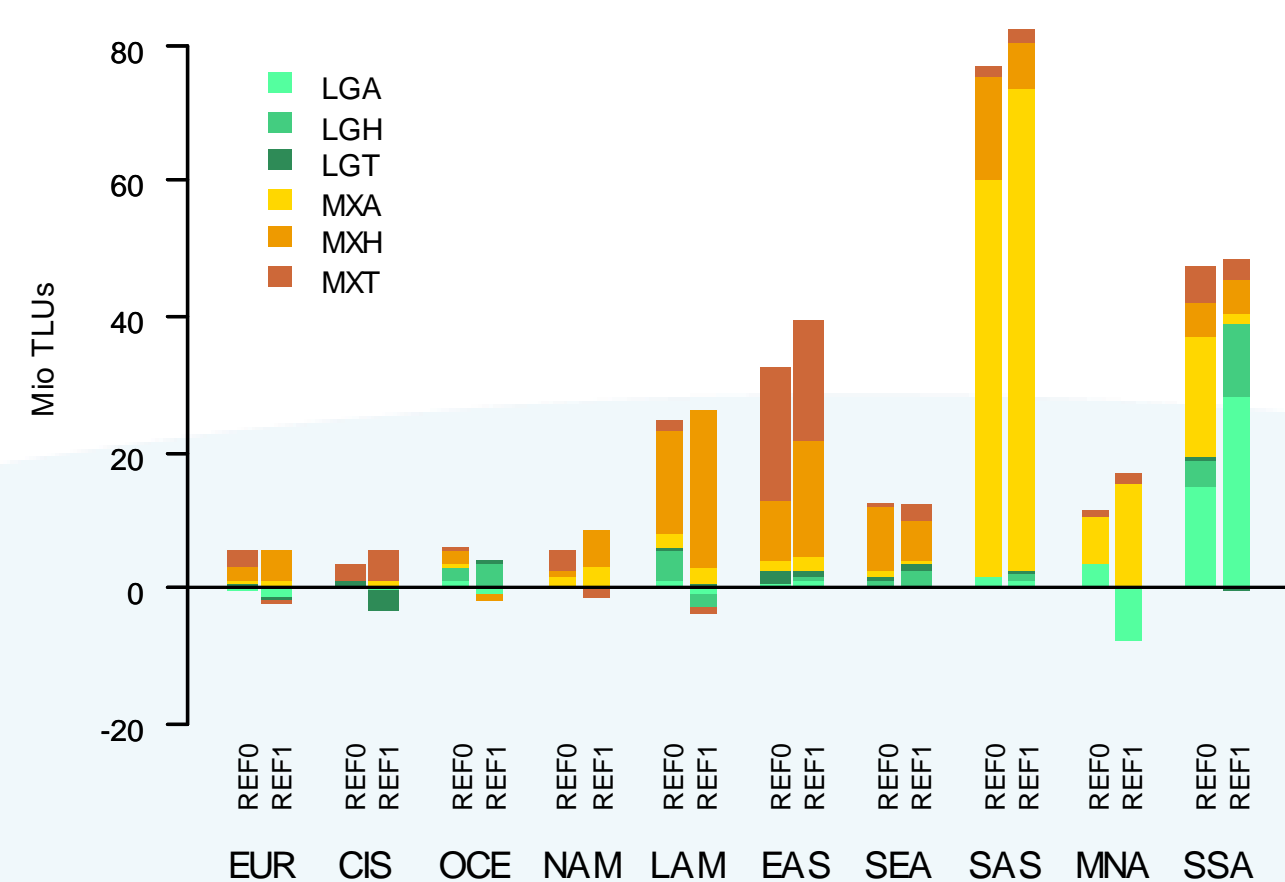


Milk production

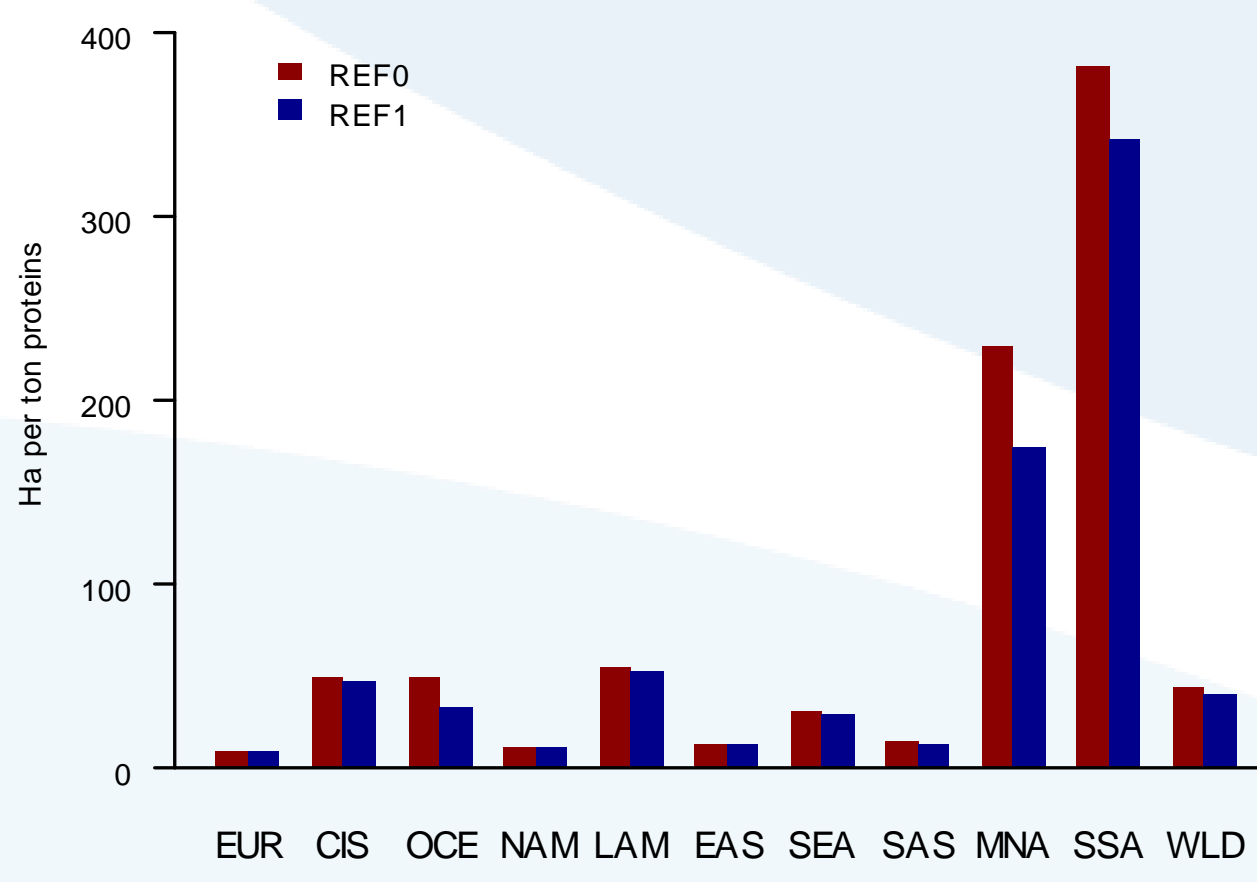


Source: Herrero, Havlík, et al. (Forthcoming)

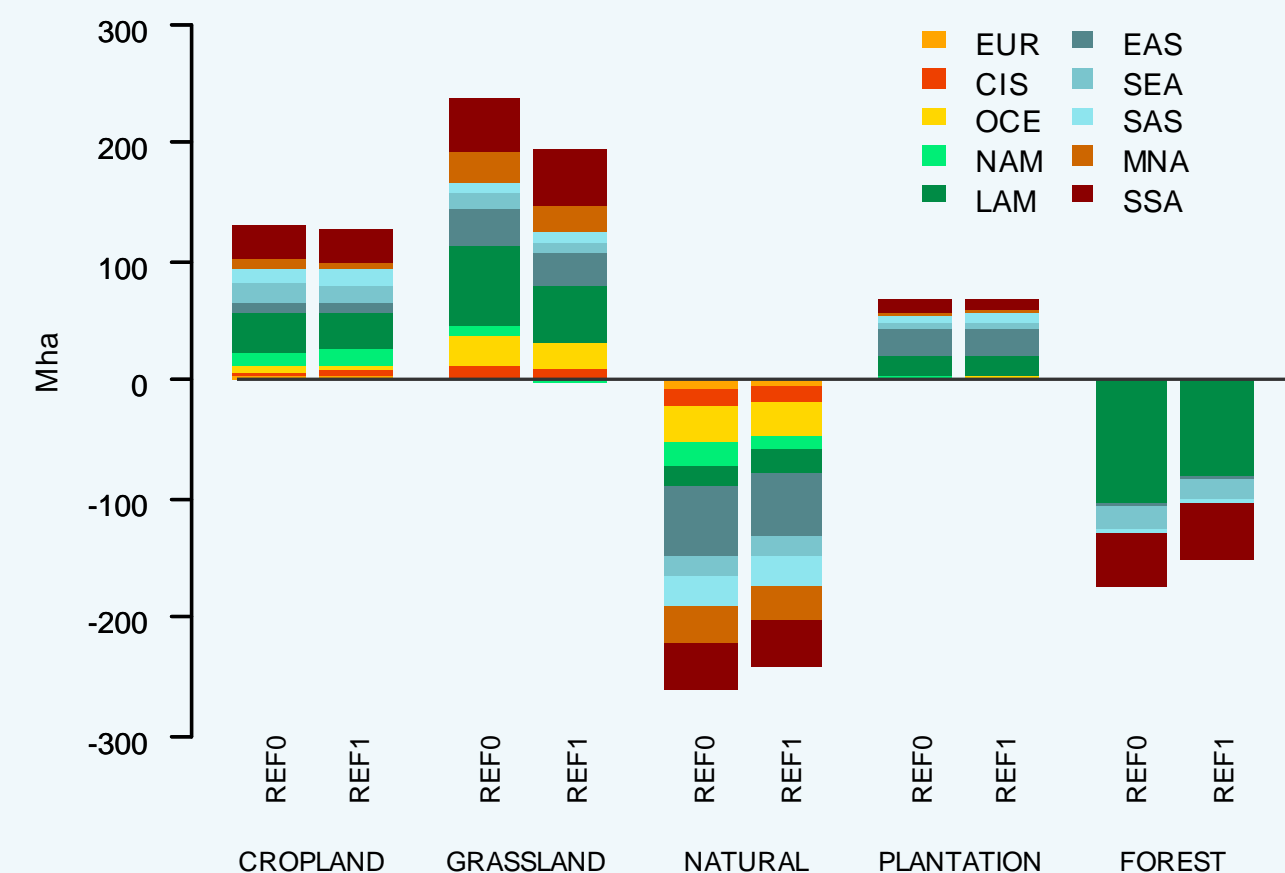
Dairy herd change 2000-2030



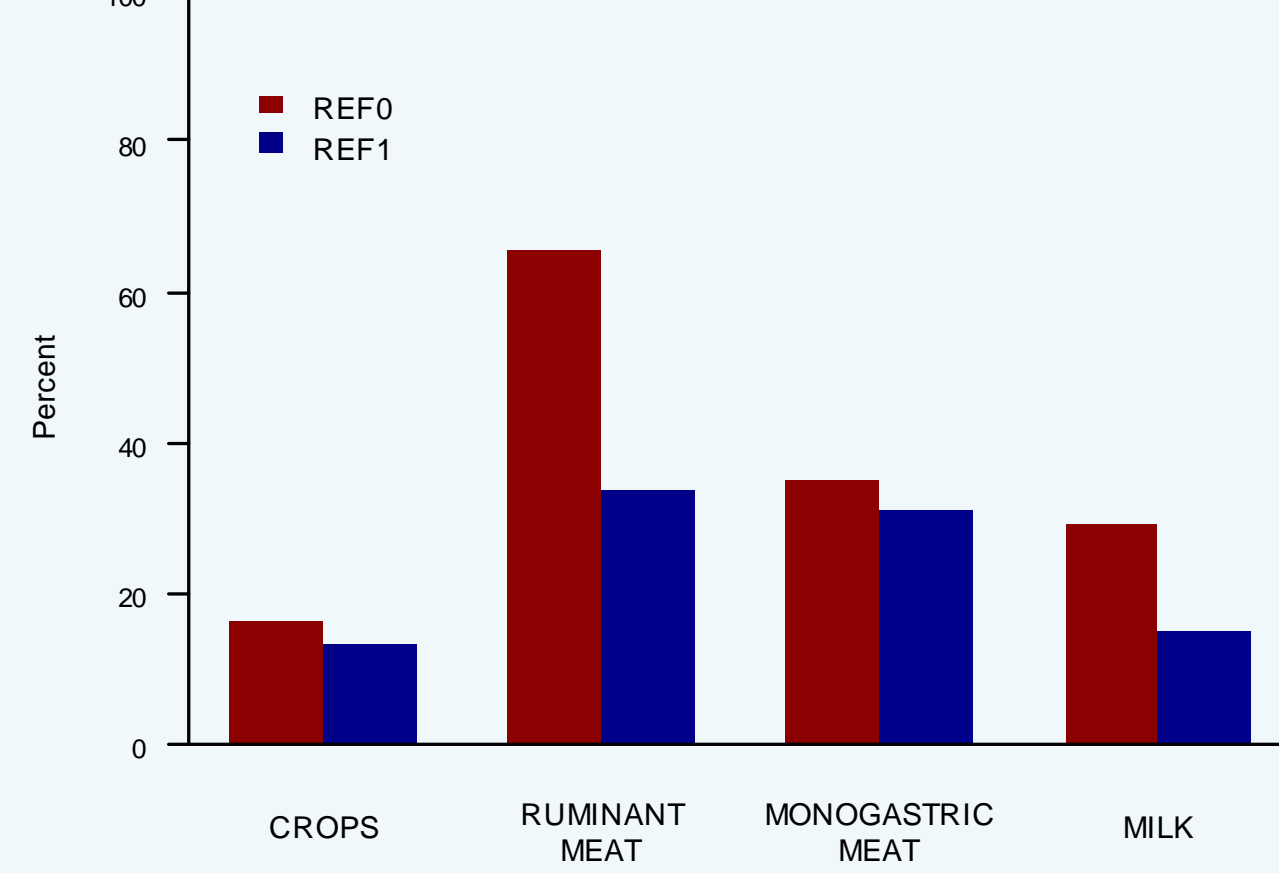
Land intensity of milk production in 2030



Land use change 2000-2030



Price changes 2000-2030



RESULTS

- Dairy herd expansion will mostly occur in Mixed systems.
- In Latin America and Mid-East North Africa, slight decreases in grassland based systems (LG) likely (REF1) while in Arid zones of SubSaharan Africa LG systems preferred
- LPS structure adjustments (REF1) lead to
 - higher land use efficiency in the most land intensive regions

14% less deforestation and 20% less Other Natural Land loss

b) Lower food prices

CONCLUSION

- Rigid LPS structure socially and environmentally unsustainable
- Neglecting LPS adjustments in economic modeling may lead to overestimation of negative effects of increased livestock production
- LPS structure adjustments are only ONE component of sustainable intensification, other options need to be explored

Further reading: Havlík, P., Valin, H., Mosnier, A., Obersteiner, M., Baker, J.S., Herrero, M., Rufino, M.C., Schmid, E. (Forthcoming). Crop Productivity and the Global Livestock Sector: Implications for Land Use Change and Greenhouse Gas Emissions. *American Journal of Agricultural Economics*: in press.